

REMARKS

By this Amendment claim 27 has been amended to include the features of claims 29-31 (now cancelled) and claim 53 has been amended to include the features of claims 55 and 56 (now canceled). Entry is requested.

In the outstanding Office Action the examiner has rejected claims 27-29, 32-36, 38-48, 53, 54 and 58-61 under 35 U.S.C. 103(a) as being unpatentable over Shimoda, and he has rejected claims 30, 31, 37, 49-52 and 55-57 under 35 U.S.C. 103(a) as being unpatentable over Shimoda in view of Ganser.

The applicants assert that these rejections cannot be applied to the amended claims.

Shimoda discloses an internal combustion engine which includes means for operation such that fuel injection is initiated in a case of low to medium load at a crank angle of between 30° and 10° before top dead center and the exhaust gas recirculation rate is between 40% and 60%. Further Shimoda discloses that, with medium to high load, the fuel injection is initiated at a crank angle of between 10° and 0° before top dead center, wherein the exhaust gas recirculation rate is set to 50% to 70%.

In contrast to Shimoda, in the present invention the exhaust gas recirculation rate is only between 20% and 40% with medium load. A

major part of the injection happens after top dead center. In order to enable the HPLI-combustion method, injection pressures of at least 1000 bar are required (Shimoda is silent with respect to the injection pressure). The advantage of the HPLI-combustion method lies in very low NO_x and particulate emission and in the relatively high exhaust gas temperature, which in turn is advantageous in the regeneration of devices for treatment of the particle-exhaust gas stream (see p. 4, lines 17 to 21 of the present application).

As described in page 2, lines 8 to 17 of the present application, Shimoda describes a diesel engine operating according to the HCLI-method in which combustion temperature and ignition lag are chosen in such a way that in the region of low to medium load the combustion temperature lies below the temperature of NO_x-formation and the air ratio lies above the value where particulates are produced. Combustion temperature is regulated by varying the exhaust gas recirculation rate, ignition lag is regulated via the timing of fuel injection. At medium to high load the combustion temperature is lowered such that NO_x and particulate formation are both avoided. It is disadvantageous that especially in the medium load region a low air ratio combines with low combustion temperature and thus efficiency is lost.

For HCLI combustion injection pressures lower than 1000 bar are sufficient.


However, nothing in Ganser would suggest modification of Shimoda
so as to suggest the methods as defined in applicants' claims 27 and 53.

Favorable reevaluation of this application is requested.

Respectfully submitted,

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